

## 184 Faraday's Researches

is only another mode of the exertion of chemical forces. It is, the production of the *electric spark* before any contact of metals is made, and by the exertion of *pure and unmixed chemical forces*. The experiment, which will be described further on (691); consists in obtaining the spark upon making contact between a plate of zinc and a plate of copper plunged into dilute sulphuric acid. In order to make the arrangement as elementary as possible, mercurial surfaces were dismissed,, and the contact made by a copper wire connected with the copper plate,, and then brought to touch a clean part of the zinc plate. The electric spark appeared, and it must of necessity have existed and passed *before the zinc and the copper were in contact*

651. In order to render more distinct the principles which I have been endeavouring to establish, I will restate them in their simplest form, according to my present belief. The electricity of the voltaic pile (591, *note*) is not dependent either in its origin or its continuance upon the contact of the metals with each other (615,650). It is entirely due to chemical action (617), and is proportionate in its intensity to the intensity of the affinities concerned in its production (643); and in its quantity to the quantity of matter which has been chemically active during its evolution (604). This definite production is again one of the strongest proofs that the electricity is of chemical origin.

652. As *volta-electro-generation* is a case of mere chemical action, so *volta-electro-decomposition* is simply a case of the preponderance of one set of chemical affinities more powerful in their nature, over another set which are less powerful: and if the instance of two opposing sets of such forces (626) be considered, and their mutual relation and dependence borne in mind, there appears no necessity for using, in respect to such cases, any other term than chemical affinity (though that of electricity may be very convenient) or supposing any new agent to be concerned in producing the results; for we may consider that the powers at the two places of action are in direct communion and balanced against each other through the medium of the metals (626), fig. 36, in a manner analogous to that in

which mechanical forces are balanced against each other by the intervention of the lever (767).

653. All the facts show us that that power commonly called chemical affinity, can be communicated to a distance through the metals and certain forms of  $\wedge$ carbon; that the electric cur-